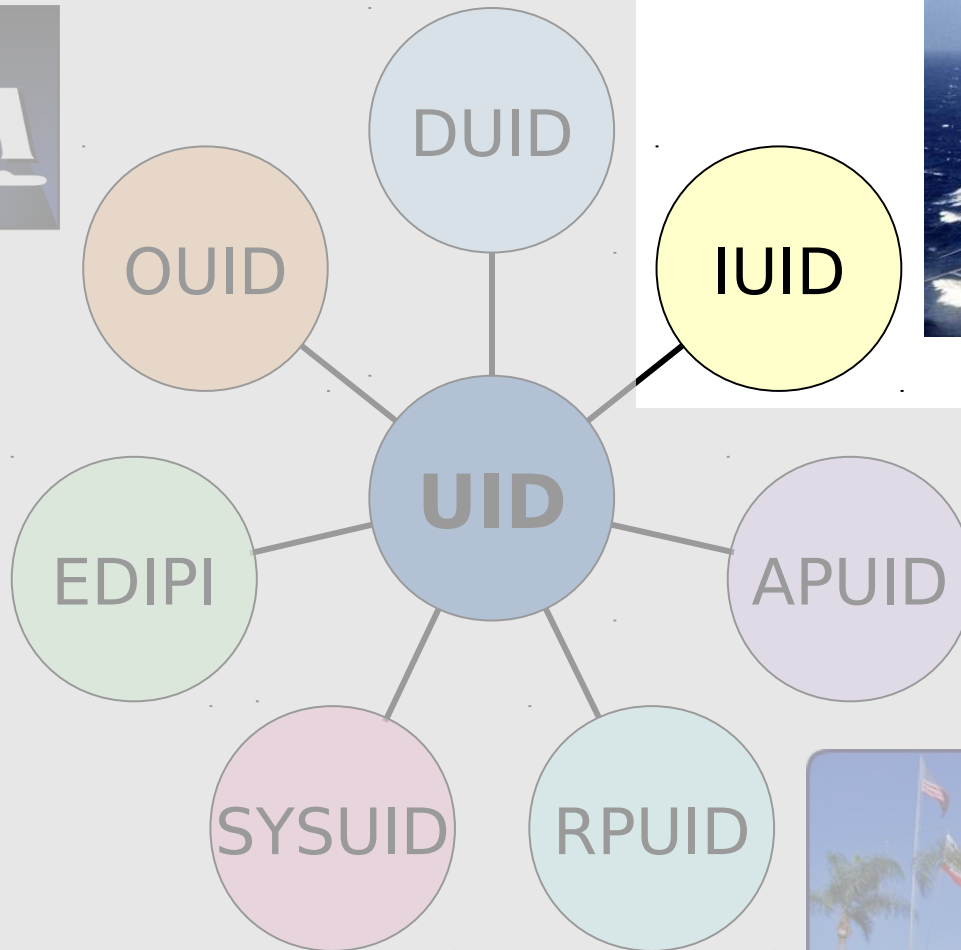


# Item Unique Identification (IUID) 101

IUID Center  
Representative  
NSWC Corona, IUID  
Center  
12 May 2011<sup>1</sup>

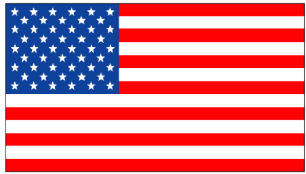
# The World of Unique Identification (UID)



# Item Unique Identification

(IUID)

**IUID is a system of marking items with globally unique Unique Item Identifiers (UIIs) that distinguish them from all other like and unlike items**



UID/IUID is mandated within the DoD for all new item acquisitions, items the government already owns (legacy items), and government furnished property (GFP) meeting specific criteria



NATO  
Policy Active  
STANAG 2290  
APUID-1



Netherlands  
Policy active

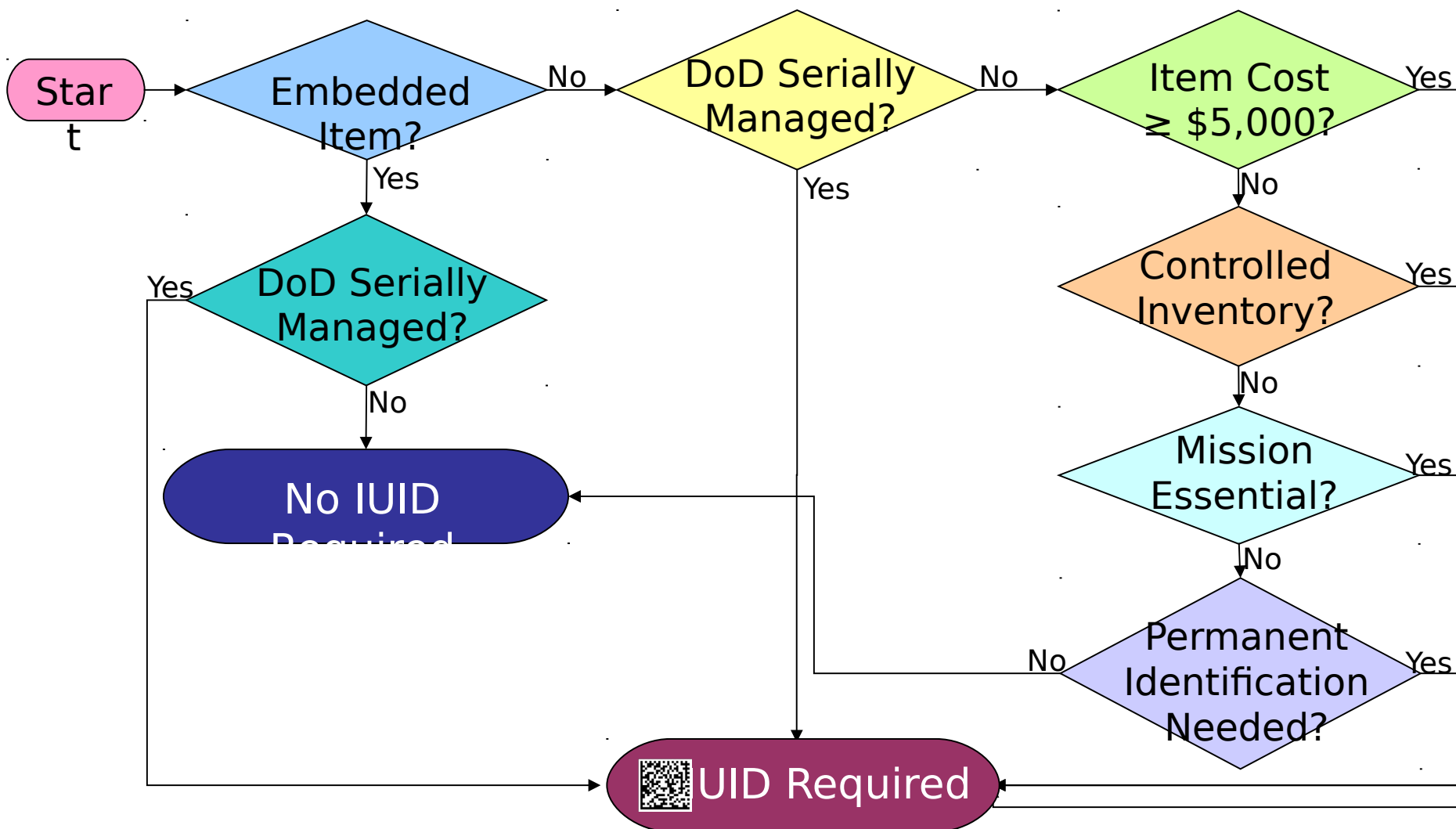


Canada  
Clause  
Implement  
ed

# Where is the Requirement?

- OUSD (AT&L) Policy Memoranda
  - IUID Requirement for New Acquisitions, 29 Jul 03
  - IUID Requirement for Legacy and GFP, 23 Dec 04
  - IUID Policy Refinement for Secondary Items in Use or in Inventory, 30 Dec 10
- DoD Directive
  - 8320.03 UID Standards for a Net-Centric DoD
- DoD Instructions
  - 4151.19 Serialized Item Management for Materiel Maintenance
  - 5000.02 Operation of the Defense Acquisition System
  - 5000.64 Accountability and Management of DoD-Owned Equipment and
- Other Accountable Property
  - 8320.04 IUID Standards for Tangible Personal Property
- DFARS Prescription and Clauses
  - 252.211-7003 Item Identification and Valuation
  - 252.211-7007 Reporting of Government-Furnished Equipment in the DoD Item Unique Identification (IUID) Registry
  - 211.274 Item Identification and Valuation Requirements
- SECNAV Instruction

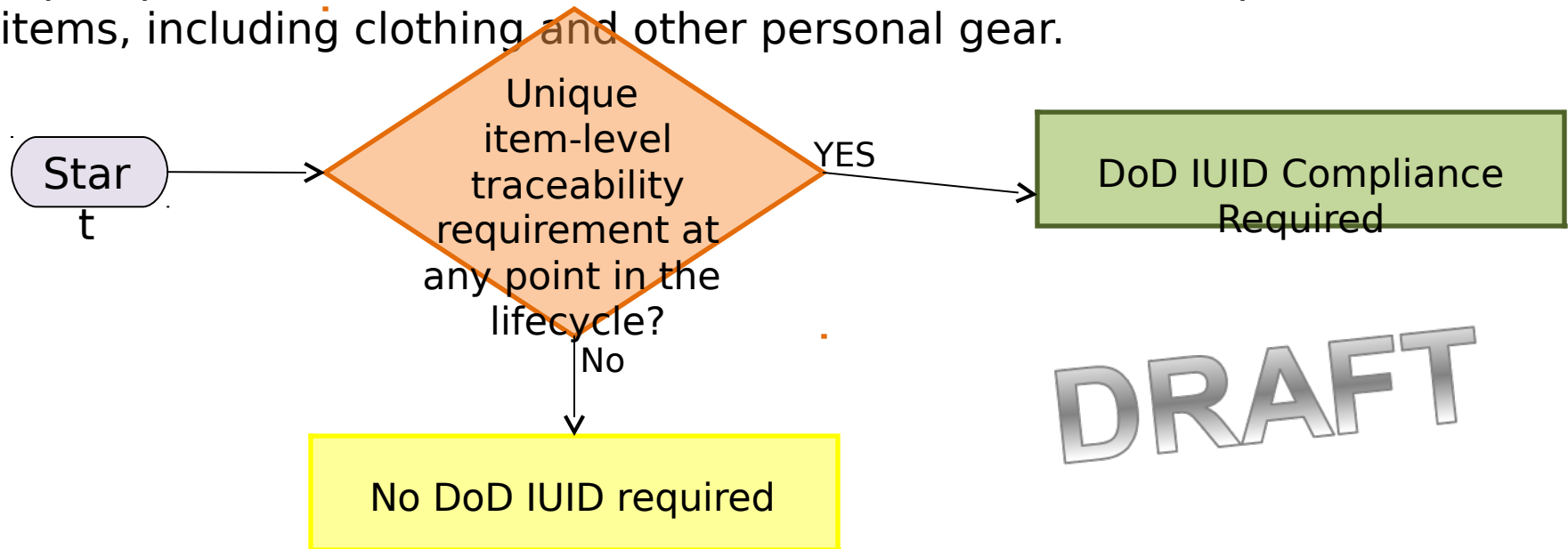
# What is the Policy for DoD?



# What is the Policy for Secondary Items in Inventory or Use?

**Unique item-level traceability:** the requirement to trace lifecycle management events related to acquisition, property accountability, storage, operation, maintenance, safety, physical security, retirement, and disposal by each individual item.

**Secondary item:** an item that is not defined as a principle item and includes reparable components, subsystems, and assemblies, consumable repair parts, bulk items and material, subsistence, and expendable end items, including clothing and other personal gear.



DRAFT

# Automatic Identification Technology (AIT)

1-D

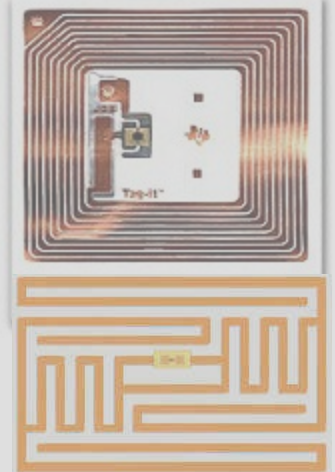
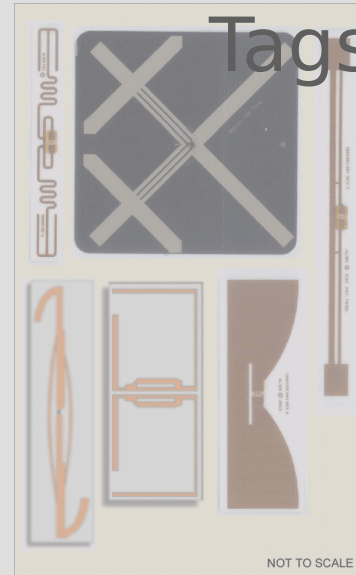


es

Contact  
Memory  
Buttons



Passive RFID  
Tags



EPC RFID  
Tag

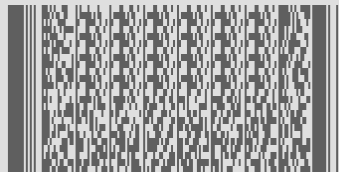
2-D Barcodes



Data Matrix



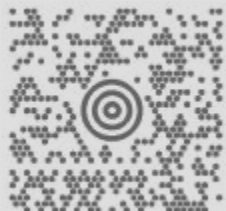
QR Code



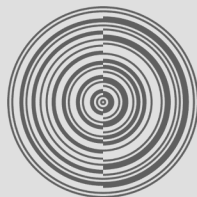
PDF417



Aztec



MaxiCode



Bullseye

Active RFID Tags



# Scope of the UII

## **A UII is...**

- a data element
- a unique identifier for an item
- globally unique
- permanent
- created by concatenating specific data elements
- an enabler for business intelligence

## **A UII is not...**

- a device for communicating data, such as Radio Frequency Identification (RFID) tags or contact memory buttons
- a replacement for the National Stock Number (NSN)
- intelligent data that yields



# Why IUID?

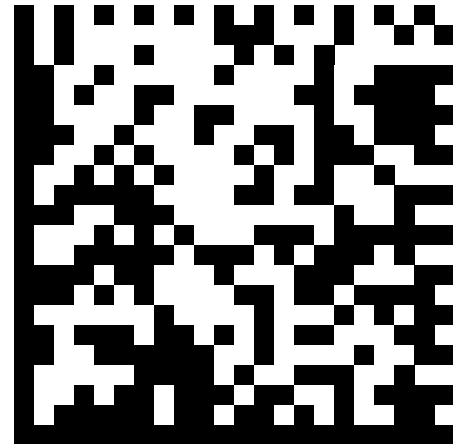
IUID provides...

- the “**data key**” to item lifecycle **traceability** in business processes and information systems
- **reliable** and **accurate data** for financial, accountability, and asset management purposes

IUID enables...

- the discovery and **correlation** of item information
- **globally accessible** and secure enterprise data
- joint **paperless** management

# Can You Spot the IUID?



Each one is a data matrix, but only one is an IUID

**An IUID is always a data matrix**  
**A data matrix is not always an IUID**

# A Tale of Two Constructs



What's an EID?  
Identifies the organization  
ensuring the uniqueness  
of the UI

Construct #1: Serialized within the enterprise identifier (EID)

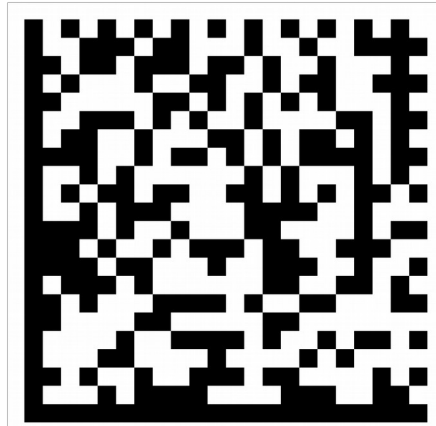
Contains the EID and the serial number (no part number)

Construct #2: Serialized within the part number

Contains the EID, part number, and serial number  
There are three permitted format codes for either construct

The format code determines the semantics of the encoded string

# Turning a Data Matrix into an IUID



The right information  
encoded into the right  
kind of mark

Syntax

[ ) > <sup>R</sup>/<sub>S</sub> 06 <sup>G</sup>/<sub>S</sub> 7 L N 4 1 1 6 4 <sup>G</sup>/<sub>S</sub> 1 P T 1 2 3 <sup>G</sup>/<sub>S</sub> S 5 3 1 <sup>R</sup>/<sub>S</sub> E O T

Format Code:

Data Identifiers:

Enterprise Identifier:

Part Number:

Serial Number:

Unique Item Identifier (UII) : LDN41164T123531

# IUID Data Constraints

- Must be encoded into an ECC200 Data Matrix barcode
- Must include syntax from ISO/IEC 15434
- Must include appropriate semantics
- Must adhere to data element length requirements
- Must use only A through Z, 0 through 9, /, and –  
No lower case letters, periods, asterisks, commas, ...
- $Ull \leq 50$  characters
- Ull must be unique across the globe
- Ull must be “permanent”... forever

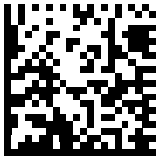
# Vocabulary Recap – Part I

**Unique Identification (UID)** is a system of identifying entities to distinguish them from each other.

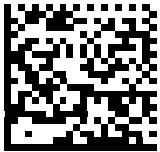
**Item Unique Identification (IUID)** is a system of marking items with globally unique, Unique Item Identifiers (UIIs) that distinguish them from all other like and unlike items.

**Unique Item Identifier (UII)** is a string of characters which is globally unique. Exactly one UII is assigned to exactly one item.

# Vocabulary Recap – Part II



**Data Matrix** is a two-dimensional matrix barcode made up of square modules arranged within a perimeter finder pattern



**UID Compliant Data Matrix** is an ECC200 Data Matrix encoded in accordance with the semantics of ISO 15418 or ATA CSDD, syntax of ISO 15434, and all required data

**UID Compliant Data Matrix Encoded String**

[><sup>R</sup>/<sub>S</sub>06<sup>G</sup>/<sub>S</sub>7LN41164<sup>G</sup>/<sub>S</sub>1PT123<sup>G</sup>/<sub>S</sub>S531<sup>R</sup>/<sub>S</sub>E<sub>O</sub>T

# Tips for IUID Specifications in Contracts

## Can specify...

- ...mark shall be read in full sunlight

- ...mark shall be read by a {fill in name of barcode scanner here}

- ...mark shall be placed {fill in somewhere convenient to read here}

- ...mark shall be readable after rubbing the mark with a hydraulic-fluid-dipped thumb

- ...mark shall be readable after {fill in some overhaul procedure here}

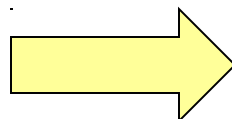
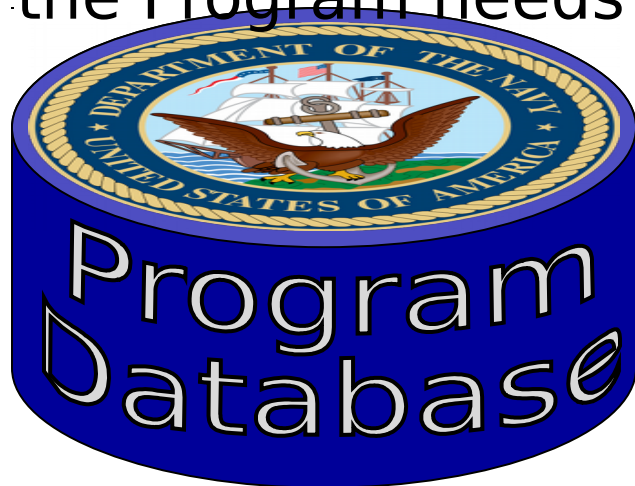
## Cannot specify...

- ...what data to put into the mark



# The IUID Registry

Contains all  
the  
data/information  
the Program needs



- Limited to the Program
- Feeds the IUID Registry

UNCLASSIFIED

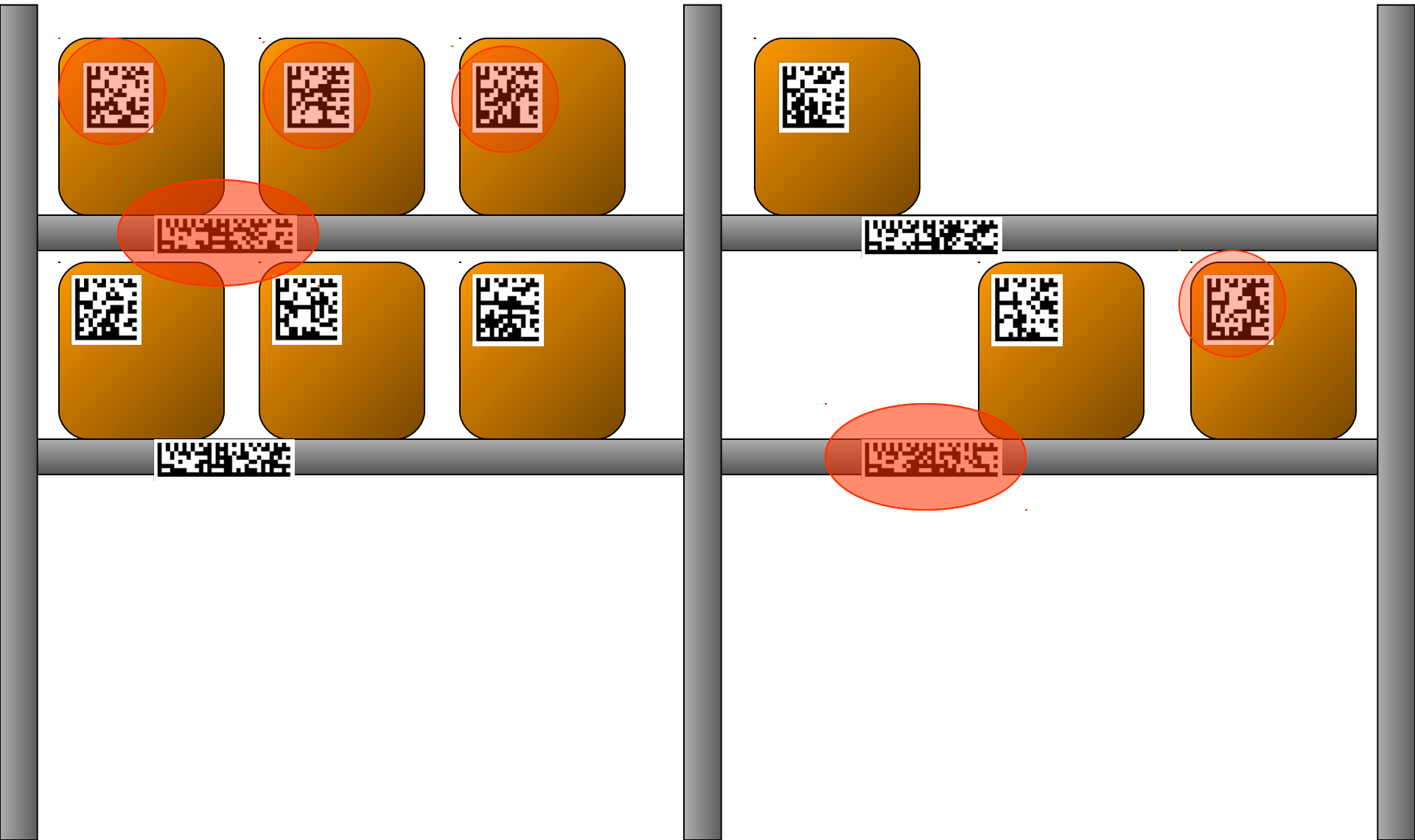
- ~~Location~~
- Condition



- Spans all DoD
- Ensures uniqueness

UNCLASSIFIED

# Business Rules Supported by Barcode Scanning



# You Don't Know What You've Got 'Til It's Gone

## Keeping Track of 4860 Items in a Warehouse



### Without Scanning...

- Full inventory never completed
- Sample data estimates 32.4 hours to complete inventory with 2% error rate

### With IUID Scanning...

- Full inventory completed in 6 hours
- Experience with scanning decreases inventory time to 55 minutes with 100% accuracy



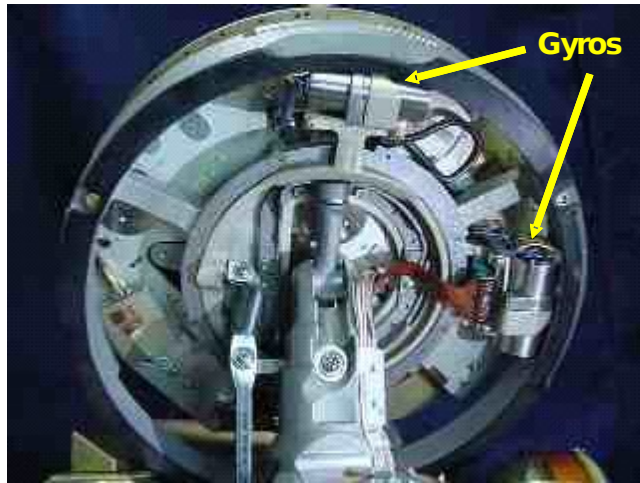
# IUID in Maintenance

- You could scan the IUID mark on each test instrument <sup>36 months</sup> Look up the model number <sup>32 months</sup> fast! <sup>41 months</sup>
    - You could keep track of an individual TI's calibration
    - Identify poor performers
    - Lots of Manufacturers Procedures Calibrators
    - Calculate calibration intervals for each specific TI
  - Then pull the calibration procedure as usual. <sup>6 months</sup>
    - You could scan each standard used to calibrate
    - Ensure standard(s) in cal cycle
    - Identify equipment calibrated by bad standards
  - And calibrate...as usual. <sup>5 months</sup>
  - And ship...as usual. <sup>5 months</sup>
- OR...**

**Many of the Benefits are Universal**

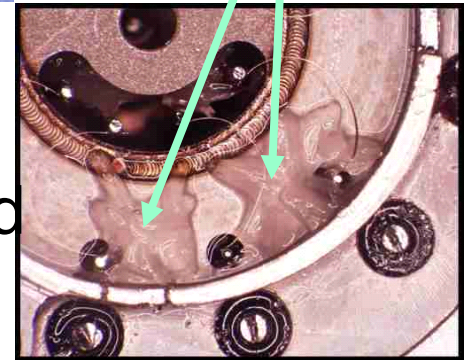
# Good Data, Good Analysis

Test data analysis found a problem with gyroscopes used in STANDARD Missiles



Configuration data identified affected missiles and targeted specific units for testing

Crystallized Deposits



Location data found a convenient unit to test

**lateral Damage = None**  
**Casualties = 0**  
**Misfires = 0**

# Lessons Learned

- IUID is about more than marking and registering concatenated UIIs and their data elements
- IUID should be considered in the global context
  - Not just a DoD initiative
  - International benefits across government agencies, industry, coalition partners
- Identify and involve all stakeholder groups in planning efforts
  - Groups involved in implementing IUID
  - Groups that can and will benefit from IUID
- Consider existing marking item management practices first
  - How are items marked today?
  - Is there available room to add IUID marking on existing data plates and labels?
- Ensure serialized item management practices are integrated with IUID
  - IUID must be the data key for SIM to enable true lifecycle data association



# Lessons Learned

- DoD is responsible for determining which items require IUID in solicitations
  - Contractors may go beyond IUID requirements
- Government must communicate requirements clearly
  - Contract structure (e.g. use of line items, attachments, exhibits)
  - Provision of technical authority and documentation when required
  - For items used in multiple programs, if one requires IUID, all should require IUID
- Ensure IUID is integrated into Quality Assurance processes
  - Quality must be introduced at the front end
  - Readability and accuracy are crucial throughout the lifecycle
- IUID can serve as a forcing function to standardize
  - Mergers and acquisitions have created complexity in property management
  - Manufacturers can benefit from lifecycle data as well as government

# IUID Resources

OSD UID Policy Office Website [www.uniqueid.org](http://www.uniqueid.org)

Trusted site for policy, updates, FAQs, and IUID newsletter

DoN IUID Website

[https://acquisition.navy.mil/rda/home/acquisition\\_one\\_source/item\\_unique\\_identification\\_iuid](https://acquisition.navy.mil/rda/home/acquisition_one_source/item_unique_identification_iuid)

MIL-STD 130 (current version is N as of 15 May 2011)

Marking standards and requirements

DoD Guide to Uniquely Identifying Items, v2.0

Business rules, additional guidance for legacy items

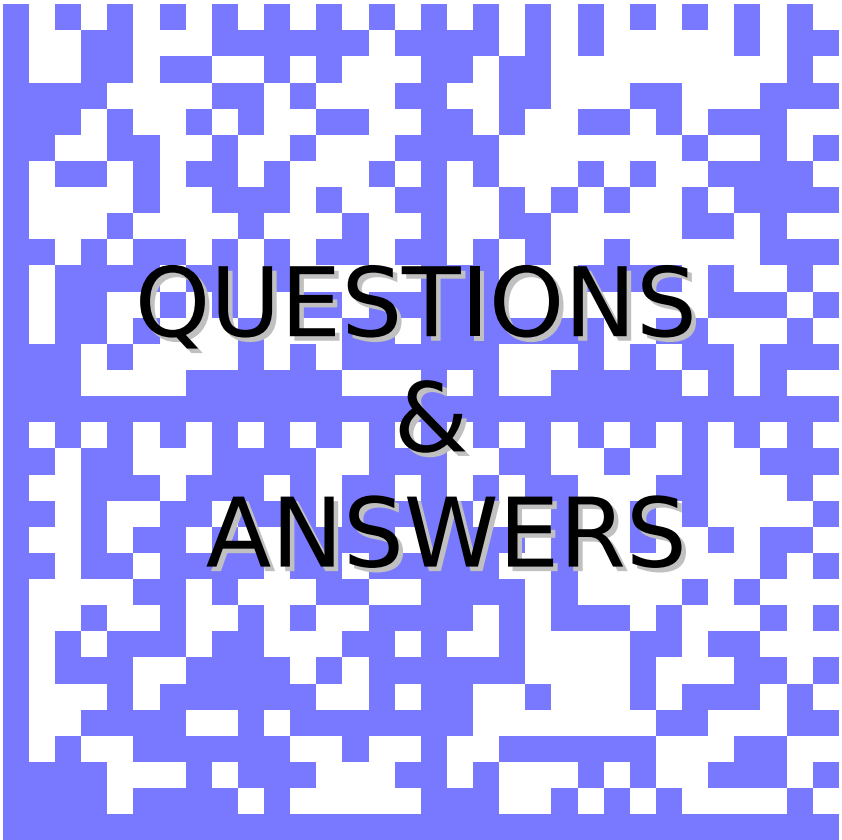
IUID Toolkit [www.iuidtoolkit.com](http://www.iuidtoolkit.com)

Role based roadmaps for IUID implementation

Defense Acquisition University (DAU) [www.dau.mil](http://www.dau.mil)

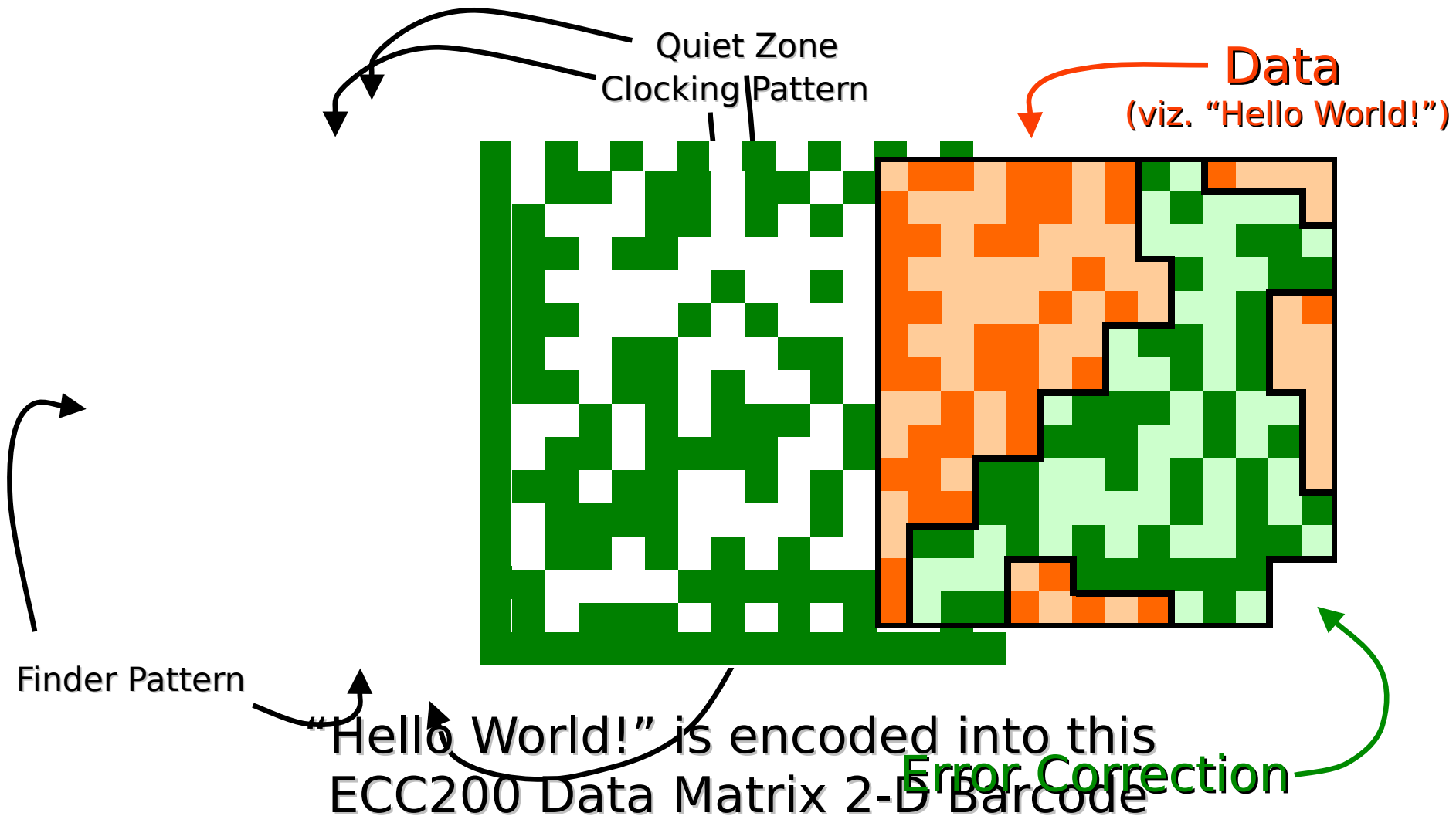
Continuous Learning Courses (CLM200, CLE 040) to increase IUID knowledge



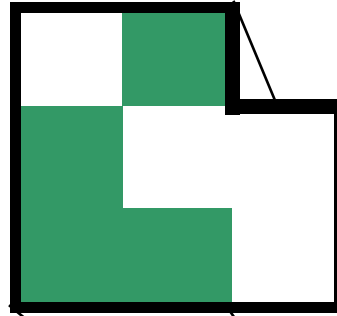
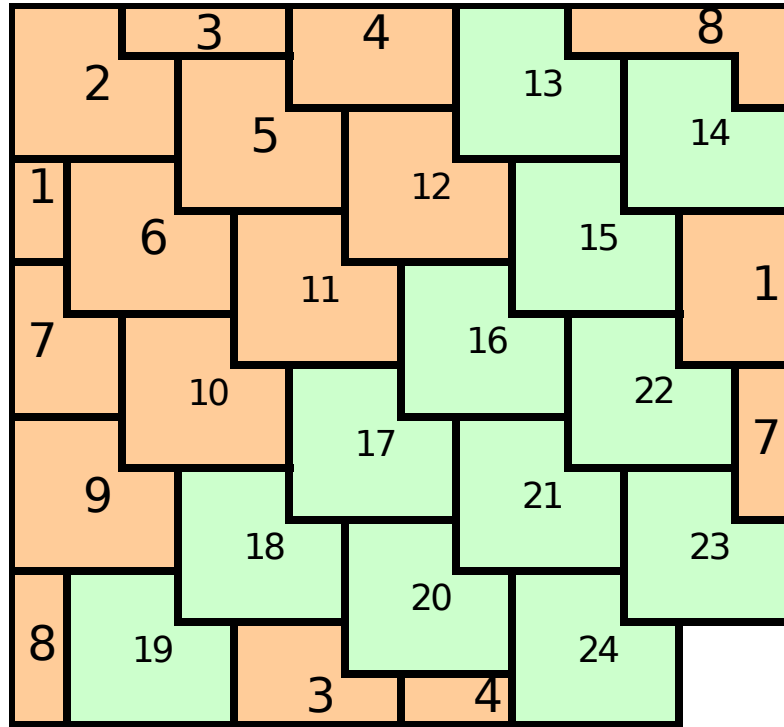


# QUESTIONS & ANSWERS

# Hello World!



# ECC 200 Data Matrix Map

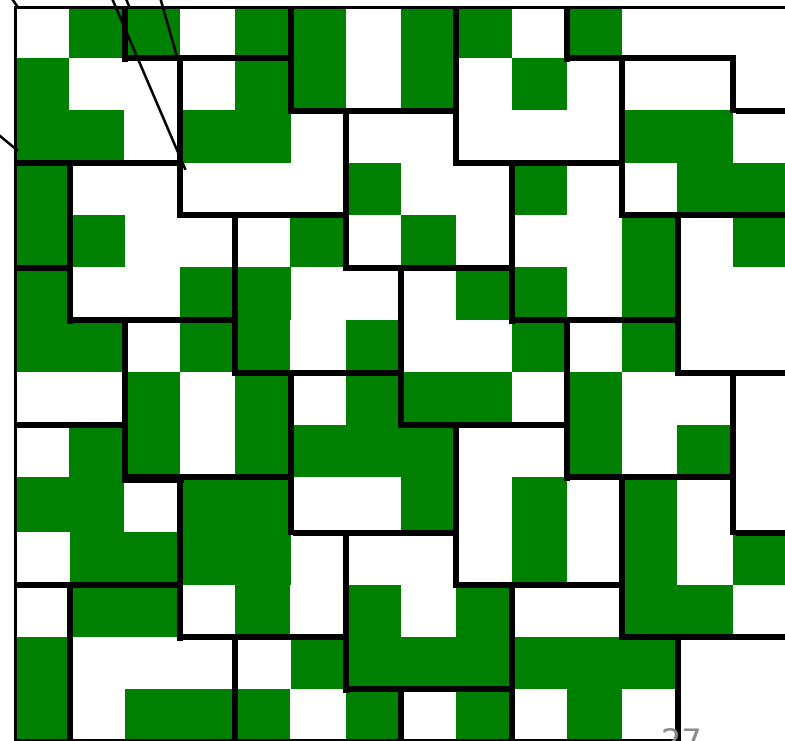


01100110 = 102

**ASCII → “e”**

Hello World!

1	2	
3	4	5
6	7	8



A 16 x 16 Data Matrix holds  
12 bytes with the data  
&  
12 error-correcting bytes

# Reading vs. Verifying Marks

The vocabulary of IUID distinguishes “reading,” “verifying,” and “validating”

**Reading** the mark decodes the text in the mark.

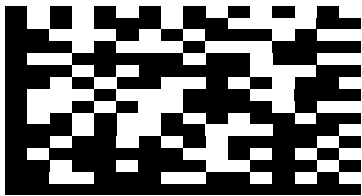
**Verifying** the mark ensures the quality of the mark meets the standards for contrast, squareness, straight edges, etc.

**Validating** the mark makes sure all of the correct ASCII characters that ought to be in the mark are in the mark. It makes sure that all the illegal characters that shouldn't be in the mark aren't. It makes sure that all other IUID business rules are followed with respect to the mark's content.

# Verification

Verification grades (“A”–“F”) eight characteristics of the mark

Grades of “B” or higher are required to pass the mark



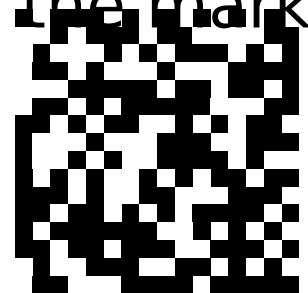
Axial  
Non-  
uniformity



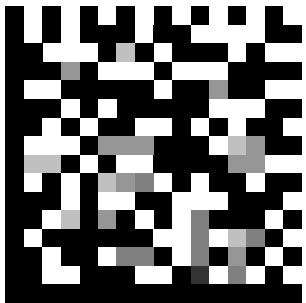
Grid  
Non-  
uniformity



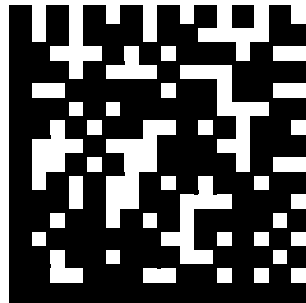
Unused  
Error  
Correction



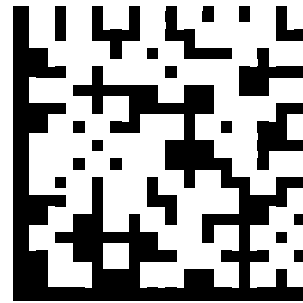
Fixed Pattern  
Damage



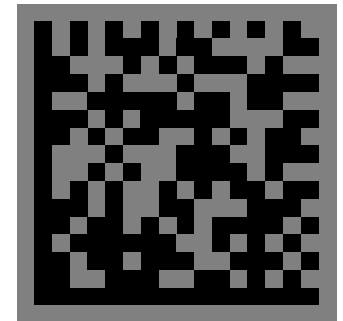
Modulation



Over-print



Under-print



Contrast

# A Readable, Failing Mark

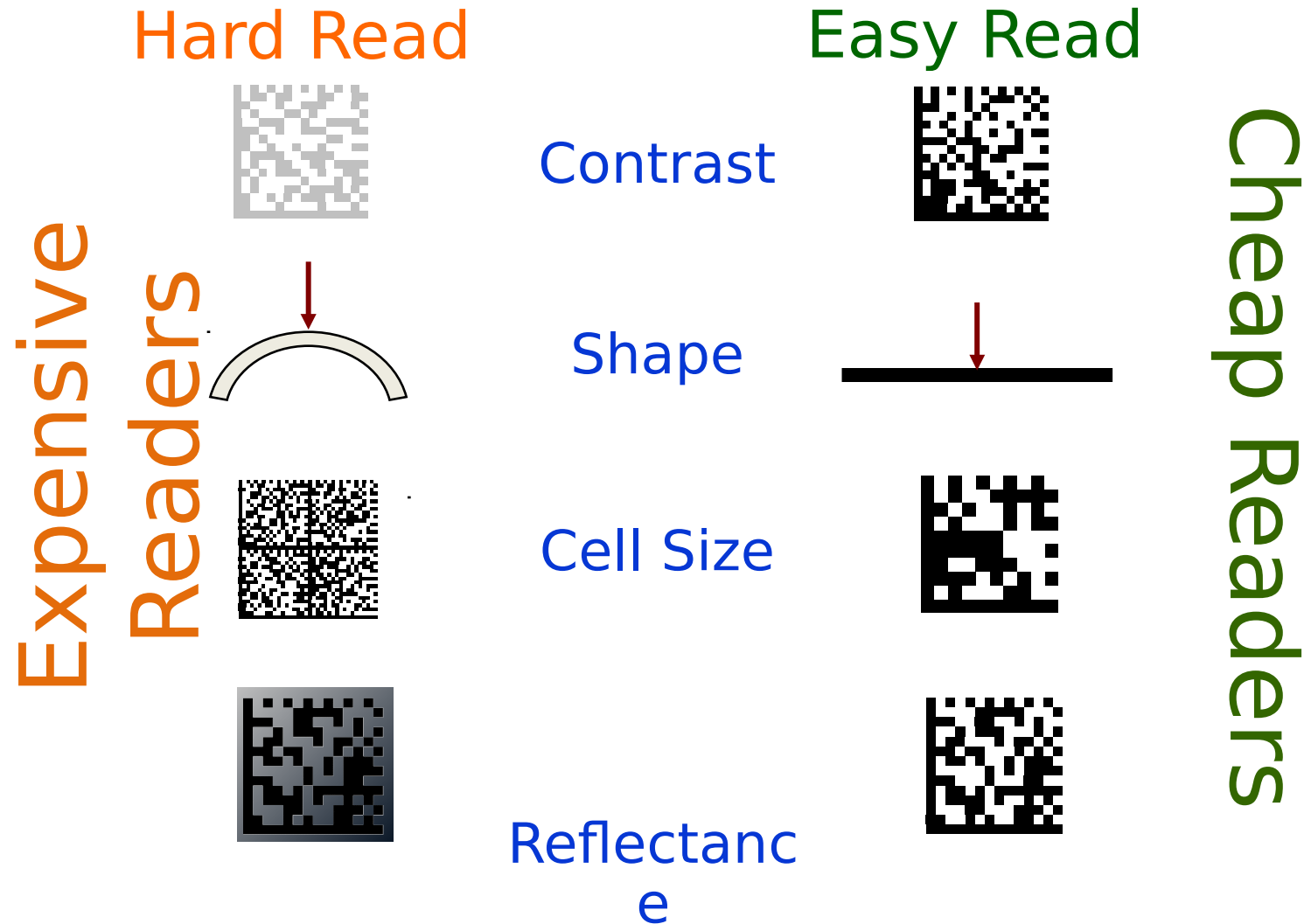


UNDER PRINT  
OVER PRINT

CLOCKING PATTERN  
DAMAGE

FINDER PATTERN  
DAMAGE

# Readability of the Mark

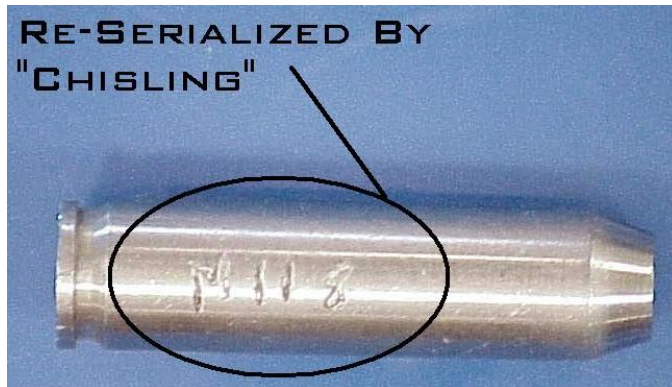


# When a Marine Needs to Turn in M118... They Turn in M118

**Marines reserialize gages to pass inspection**

**Accountability is lost**

**Errors enter the information system**



**With IUID Reserialization is No Longer  
a Problem**